

Toward a Theory of Optimal Financial Structure

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Abstract

Each institutional arrangement in a financial system has both advantages and disadvantages in mobilizing savings, allocating capital, diversifying risks, and processing information when facilitating financial transactions. Meanwhile, the factor endowment in an economy at each stage of its development determines the optimal industrial structure in the real sector, which in turn

constitutes the main determinant of the size distribution and risk features of viable enterprises with implications for the appropriate institutional arrangement of financial services at that stage. Therefore, there is an endogenously determined optimal financial structure for the economy at each stage of development.

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Toward a Theory of Optimal Financial Structure¹

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I. Introduction

Finance is playing an increasingly significant role in modern economies. The current global financial crisis calls for improving domestic as well as international financial regulations and supervisions. The paper attempts to bring attention to the structure of the financial system in a country. The financial structure varies across countries. Understanding the difference in financial structure and how it is related to economic development can provide policy implications for many countries, especially those developing countries which are making efforts to strengthen their financial system. Financial economists have debated the relative importance of banks and financial markets in a financial system for decades. There is also a vast body of literature devoted to analyzing the relative advantages of various banking structures. But taken as a whole, the existing research has not reached an agreement on the strengths and weaknesses of various types of financial structure in promoting economic growth. Trying to provide a new perspective in clarifying our understanding of the relationship between financial structure and economic development, we propose in this paper a theoretical hypothesis that ‘the optimal financial structure in an economy depends on its stage of economic development.’

The demands for most financial services are derived from the demands for serving the needs of real economy. However, the existing studies usually start from analyzing characteristics of various financial institutional arrangements and then discuss possible impacts of different financial structures upon economic performance in an economy. Since each financial arrangement has its own advantages and disadvantages in mobilizing savings, allocating funds, and diversifying risks, it is not surprising that the literature is not able to decide on what type of financial structure is most beneficial to economic development. We believe that it is necessary to study both the specific nature of real sector at different stages of development and the nature of various institutional arrangements in the financial system in order to sharpen our understanding of the relationship between them in the process of economic development. However, characteristics of the real economy have not been given enough attention in the literature on financial structure.

The main idea of this paper is as follows: An economy at each stage of its development has a given specific structure of factor endowment¹, which endogenously determines its optimal industrial structure at that stage. Enterprises operating in different industries are distinct in terms of firm size, risk, and financing needs. Thus the demand of the real economy for financial services at some development stages can be systemically different from that of the same economy at other stages. Only when the characteristics of financial structure match those of the industrial structure in the economy, can the financial system efficiently perform its fundamental functions and contribute to sustainable and inclusive economic development. Therefore, there exists some optimal financial structure for the economy at each of its development stages. A deviation of the financial structure from its optimal path will lead to low efficiency of the financial system and hinder economic development. While poor regulation and supervision may cause financial crisis, serious mismatch between the financial structure and industrial structure may also cause financial crises.

The rest of this paper consists of four sections. Section II defines “financial structure” used in this paper and summarizes the related literature; section III elaborates the main arguments of optimal financial structure; section IV discusses some policy implications of the theory; section V concludes.

II. Financial Structure and Economic Development: A Brief Literature Review

II.1 Definition of financial structure

We define “financial structure” as the composition and relative importance of various financial institutional arrangements in a financial system². This is a very general definition. Financial structure can be investigated from several dimensions depending on the purpose of

¹ Factor endowment structure is defined as the relative abundance of various factors of production, mainly labor, capital, and natural resources.

² The definition of “financial structure” is more general in this paper than that in the literature. As we shall see in the next subsection, financial structure in existing literature usually refers to the relative importance of financial markets and financial intermediaries, which is only one dimension of our definition of “financial structure”.

the research. For instance, in order to examine the channels of financial intermediation, the relative importance of financial intermediaries and financial markets will be the focus. In terms of long-term or short-term financing, the composition of monetary markets and capital markets is important. For the discussion of government regulation, the distinction and composition of formal finance and informal finance are of relevance. In the banking sector, we may want to analyze the distribution of big banks and small banks.

This paper focuses on two dimensions of financial structure: (1) the relative importance of banks and financial markets; and (2) the distribution of banks of different sizes. We believe that financial structure along these two dimensions critically affects the efficiency of the financial system in performing its fundamental functions in the process of economic development. Banks are the typical type of financial intermediaries and have very different mechanisms from financial markets in mobilizing savings, allocating capital, and diversifying risks. The relative importance of banks and markets constitutes the most important dimension of financial structure. Meanwhile, there is an obvious distinction between the way in which big banks do businesses and how small banks operate, which has implications for access to services, especially lending services, by different sizes of firms. Thus the distribution of big banks and their smaller counterparts can have a significant effect on the performance of the banking sector.

II. 2 Financial structure and economic development: A brief literature review

This subsection summarizes the literature related to the relationship between financial structure (as defined in the above subsection) and economic development.

II.2.1 Market-based vs. bank-based financial structure

One of the two established facts about the relative importance of financial markets and banks and its relationship with economic development is that financial markets tend to be more active relative to banks in countries with higher income per capita (Goldsmith, 1969;

Demirgüç-Kunt and Levine, 2001; Lin et al, 2006)¹. The existing studies have concentrated on exploring the causal relationship between financial structure and economic growth, i.e., whether market-based or bank-based financial structure is better for economic growth². As Levine (2005) summarizes, related arguments can be grouped into four views. Proponents of bank-based structure argue that banks and other financial intermediaries have advantages in collecting and processing information while financial markets provide much weaker incentives for agents to collect information ex ante and monitor borrowers (or stock issuers) ex post (Grossman and Hart, 1980; Stiglitz, 1985; Bhidé, 1993; Allen and Gale, 2000; etc.). Thus financial markets are at a disadvantage in terms of alleviating informational asymmetry and therefore a financial system with a bank-based structure should perform better in allocating resources and promoting economic development. Correspondingly, those who favor market-based structure focus on the problems created by powerful banks. Bank-based systems may involve intermediaries that have huge influence over firms and this influence may damage economic growth (Rajan, 1992). Besides, banks tend to be more cautious by nature and so bank-based systems may stymie economic innovation and impede economic growth. Furthermore, financial markets can provide richer and flexible risk management tools for agents while banks can only provide basic risk management services. There are also some financial economists who reject the importance of distinguishing the financial system as bank-based or market-based but argue that markets and banks provide complementary services (Merton, 1995; Merton and Bodie, 1995). Finally, some studies hold the “law and finance” view which emphasizes the importance of the legal system in financial development, and that “distinguishing countries by the efficiency of national legal systems in supporting financial transactions is more useful than distinguishing countries by whether they have

¹ The other established fact is that the level of financial development (usually measured by the ratio of the size of financial sector to that of GDP) is higher in countries with higher income per capita.

² While the concepts of “bank-based” and “market-based” financial structure are widely used in the literature, in our best knowledge there is no concise definition of these two types of financial structure. The generally accepted approach is to illustrate the distinction between them by comparing the financial systems in the U.S. and U.K. (as examples of market-based structure) to those in Germany and Japan (as examples of bank-based structure). However, the stock market in Japan is one the most advanced financial markets in the world while banks in the U.S. and the U.K. are among the most active and sophisticated financial intermediaries. Therefore, if put in a global context, the comparison of the financial structure in Germany and Japan and that in the U.S. and U.K. is better described as “minor difference with major similarity”, but there is “major difference with minor similarity” between the financial structure in developing countries and that in developed countries. Thus it is necessary to pay more attention to the difference in financial structure in countries at different stages of economic development in order to fully understand the relationship between financial structure and economic development.

bank-based or market-based financial systems”¹ (La Porta et al., 1997, 1998). Some empirical studies, such as Beck and Levine(2002), Demierguc-Kunt and Maksimovic(2002), and Levine(2003) etc., find results surprisingly consistent with the third and fourth views, showing that financial structure is not a first-order concern in understanding the process of economic growth after controlling for the level of financial development.

II.2.2 Banking structure and economic development

When it comes to banking structure, the literature mainly discusses whether competitive or monopolistic banking structure is better for economic growth. Traditional wisdom suggests that monopolistic banks may extract too much rent from firms, pay lower deposit interest rates, and thus lead to more severe credit rationing, which has very negative effects on economic growth. But some studies argue that monopolistic banks have more incentive to collect information, screen and monitor borrowers, and form long-term relationships with borrowers; therefore investment projects have more chances to get financed. In a competitive banking sector, borrowers can more easily shift between lenders, so banks may have less incentive and less capability to forge such long-term borrower-lender relationships. Such borrower-lender relationships are especially valuable to start-ups and new firms. Thus these studies suggest that monopolistic banking structure is beneficial to the establishment and growth of new firms. Empirical results in this area are far from conclusive. Some studies show that lower banking concentration leads to more new establishments and thus has positive implications for economic growth (Jayaratne and Strahan, 1996; Cetorelli and Strahan, 2006; etc.; World Bank 2007). Others find that new firms grow faster in economies with a more concentrated banking sector but old firms benefit from a more competitive banking structure (Jackson and Thomson, 1995; Petersen and Rajan, 1995; etc.).

II.2.3 Some comments

It seems that the empirical results on the growth impacts of bank-based and market-based financial structure are inconclusive. The basic fact mentioned at the beginning of this subsection that financial markets tend to be more active relative to banks in countries with

¹ Cited from Levine (2005).

higher income per capita deserves further exploration both theoretically and empirically: if financial structure does not matter for economic growth after controlling the level of financial development, as some studies suggest, why is there the factual trend that financial markets become more active in richer countries? While the existing studies on banking structure have focused on banking concentration, the distribution of banks of different size has not caught enough attention of researchers. A well-established fact that small businesses, which are the dominant form of business operation in developing countries, usually have difficulties in obtaining loans from big banks suggests that bank size does matter for the allocation efficiency of the banking sector. In addition, it's interesting that the above two bodies of literature developed independently while they address two different dimensions of the same question-----how financial structure affects economic growth.

But we also notice that the two parts of literature have adopted a similar research perspective. These studies usually start from examining the characteristics of various financial institutional arrangements and then discuss the possible effects of financial structure on economic development. To our understanding, the justification for this perspective may be that the specific question addressed in those studies is the effect of financial structure upon economic growth. However, this question may not be appropriately answered if it is separated from the question of how financial structure itself is determined.

There is some research studying the mechanisms affecting the determination of financial structure. Rajan and Zingales (2003) apply interest group theory to explain the difference in financial structure in countries at a similar development stage. Some studies follow the foregone "law and finance" literature emphasizing the importance of the legal system in determining financial structure. They argue that legal protection of investors and the effectiveness in implementing the law are more critical for the operation of financial markets than for banks. Thus a bank-based financial system will have advantages in countries with a weak legal system. This logic, however, needs to explain some general observations: the level of financial development and financial structure are usually different in countries with a similar legal origin but at different development stages; the financial structure in the same

country also changes as the country's economy develops. Therefore, it is necessary to take into serious consideration the endogeneity of the financial structure when analyzing the relationship between financial structure and economic development.

III. Optimal Financial Structure in Economic Development

III.1 Characteristics of various financial institutional arrangements

Each financial institutional arrangement specifies a set of rights and obligations of fund users and fund providers, exposes each party to certain risks, and entails some transaction costs. This subsection is dedicated to discussing the above characteristics of some key financial institutional arrangements.

III.1.1 Financial markets and banks

One of the main forms of direct finance is equity financing. The issuer, typically some company, raises capital by issuing stocks to fund providers and the fund providers become shareholders of the issuing firm. Proportionally to their ownership, shareholders have the right to share the issuer's future profits although the return to shares is not specified in advance and thus uncertain. In the case of liquidation, shareholders are "residual claimers" whose rights to the firm's assets are subordinate to creditors. Therefore, shareholders bear significant investment risk and thus are willing to invest only when they believe the investment is going to generate a high enough expected return. But by the same token, companies which are funded by issuing stocks do not face the risk of bankruptcy when they cannot distribute high enough dividends to their shareholders¹. In this sense, these companies face less risk of liquidation than if they were mainly financed by debts. In addition, in public equity issuing, the risk of the investment project is disseminated among many investors and thus each investor only bears a small share of the risk up to the amount of the fund invested. Stock markets where stocks are traded have also created flexible instruments and approaches

¹ This analysis still holds despite the signaling effect of dividend as extensively studied in the corporate finance literature.

for investors to diversify and manage idiosyncratic investment risk.

While shareholders are usually granted the right to vote on important matters such as election of directors, it is impractical that all shareholders participate in the daily business of the company. Although directors and management have the duty to act in the best interest of shareholders, managers' private interests may not align with that of shareholders and thus their decisions may not maximize firms' market value. In widely held corporations where each shareholder owns a small stake in the firms, the classic issue of separation of ownership and control can be a serious concern (Berle and Means, 1932). To alleviate the agency problem in public companies, many countries' governments regulate that equity issuers be audited and disclose information before the issue and afterwards¹. Since these "certification" expenses and information costs are very high and, at least to some extent, fixed, there is obvious economy of scale in equity financing. In this regard, smaller firms, which usually raise less capital, are at a disadvantage relative to their larger counterparts.

On stock markets, investors update their information and make decisions individually and thus can agree to disagree on investment projects. For firms with new technologies or innovative projects, relevant information is often sparse and there is usually a diversity of opinions about these investments. Therefore, these types of firms are more likely to get funded through stock markets (Allen and Gale, 1999).

¹ In addition to regulation of information disclosure, stock markets have developed some mechanisms to reduce the agency problem between managers and outside shareholders, such as contract clauses, concentration of ownership and large shareholders' monitoring, "voting by foot" by small shareholders, takeover, etc. Shareholders, in principle, are supposed to exercise their rights as owners through shareholder meetings, but free-riding behavior among shareholders usually undermines the effectiveness of shareholder meetings. Concentration of equity ownership can mitigate the free-riding problem associated with widely held corporations. But this comes at cost. Some of the cost is the limited diversification that these large shareholders can achieve, other cost is related to the feasibility that large shareholders may divert resources of the firm at the expense of small shareholders (Zingales, 1994; Shleifer and Vishny, 1997). Takeover provides another mechanism by which stock markets replace managers with insufficient performance and so impose effects on corporate governance (Jensen, 1988). However, the threat of takeover is not likely to be an effective control mechanism because of informational asymmetry between insiders and outsiders, information spillover effect among potential bidders, and insider managers' strategic actions deterring takeovers. Another mechanism is through shareholders' vote with their dollars and the consequential rise and fall of stock prices. Firms that do not use resources efficiently will not be able to raise additional capital. But this mechanism can only be effective to the extent that future capital must be raised from the stock market, which is often not the case in reality. Besides, high liquidity on the stock markets may lead to myopia actions on the side of investors and harm the resources allocation (Bhide, 1993). In short, the available mechanisms for stockholders to exercise control over corporate managers are only limitedly effective.

As one of the most important financial intermediaries, banks typically collect deposits and allocate capital with loan contracts. Due to the debt property of the deposit contract, banks must pay back their deposits together with interest rates specified *ex ante* when the deposits are due. By the same token, loans must be paid back to banks on the due dates. From the point of view of depositors, deposits at banks are generally safe except in extreme cases where the bank is bankrupt¹. Consequently, the return to bank deposits is usually lower than the expected return to stock investments. From the point of view of borrowers, transaction costs through borrowing from banks can be lower than issuing equities on stock markets for two reasons. First, when borrowing from one or a few banks, they do not need to publicize information and so save on informational cost and other transaction costs. Also, due to the debt property of loans, the loan interest rates are usually lower than the expected returns to stocks, which means that the borrowing firms pay relatively lower capital cost than issuing equity. However, once the firms are not able to pay back their loan obligations and fail to renegotiate with banks, they have to face the risk of bankruptcy or even liquidation. In this sense, borrowing loans is a riskier approach of financing for firms.

As specialized financial intermediaries, banks can save information costs by utilizing economies of scale in producing information about potential borrowers, screening investment alternatives, and monitoring firm managers after making loans (Boyd and Prescott, 1986; Diamond, 1984; Allen, 1990). Since banks can privatize the information they acquire and form long-term relationships with borrowers, they have stronger incentives than small shareholders on stock markets to research firms, managers, and market conditions, which have positive implications for allocation efficiency. Furthermore, powerful banks with close ties to firms can be more effective in exerting pressure on firms to repay their debts than atomistic markets (Rajan and Zingales, 1998). But like a double-edged sword, private information that banks acquire may give them so much power over firms that they can extract excessive rents from firms, which may reduce the efforts by the firms to undertake profitable and innovative investments (Rajan, 1992).

¹ With explicit deposit insurance programs provided by many countries' governments, bank deposits are still safe even when the bank is bankrupt, although there is often some cap of such insured deposits.

As it comes to risk management, banks can also achieve some extent of risk diversification by pooling a large number of deposits and diversifying their investment portfolio in different projects. But investments by banks are more concentrated compared to portfolio investments on stock markets, which is exactly the reason why banks have advantages in information production. In light of size limits to their assets, banks' capability for risk diversification is much more limited compared with the possibilities provided by stock markets.

Due to the intrinsic feature of loans and limited capability of risk diversification, banks are more concerned about the low tail of the returns to borrowers' investments. Thus banks may have an inherent preference toward prudence and tend to be more conservative in choosing investments. As a result, banks may tend to make loans to mature firms with steady cash flows instead of new firms which are more risky but often promise higher returns. Furthermore, as Allen and Gale (1999) argue, banks work better in the situation that there is sufficient information about projects and agreement on investment choices can be easily achieved, but do not work well where there is diversity of opinion about projects. Thus firms involved with new technologies and more uncertainties will find it hard to get finance from banks.

In addition to issuing equity and borrowing from banks, companies can also issue corporate bonds to raise capital. Like in the case of public equity issuing, the government usually regulate that companies issuing corporate bonds should be audited by professional auditors. Thus bond issuers have to spend significant expenses on auditing, information disclosure, and bond marketing and selling. There are also economies of scale because a large part of these costs are fixed. Again, large companies are in a better position than smaller ones in taking advantage of economies of scale in bond issuing. Due to the debt property of bonds, companies issuing bonds have to face the risk of bankruptcy and liquidation when they fail to repay the bond capital and interest. It is much more difficult to renegotiate with a large number of bond holders than with a few banks in the case of default. Thus given the operational profitability of a company, issuing bonds is riskier for the company than

borrowing from banks or issuing stocks. From the point of view of investors, investing in corporate bonds can be less risky than buying stocks because of the seniority of bonds in the case of firm bankruptcy, but it is riskier than bank deposits for the reasons that the bank can diversify its loans and corporate bonds usually lack government insurance that bank deposits enjoy implicitly or explicitly. Correspondingly, the expected return to corporate bonds is usually lower than that to stocks but higher than deposit interest rates.

III.1.2 Large and small banks

Plenty of evidence shows that there exists a type of specialization based on bank size in the banking sector. Large banks tend to shy away from small businesses but rather focus on large businesses, while small banks specialize in lending to small businesses¹. This specialization suggests that the distribution of banks of different sizes can be an important dimension for our understanding of financial structure and economic development in addition to the mix of banks and financial markets.

As we mentioned above, the size of banks affects their capability for risk diversification. Small banks with very limited assets cannot afford to make large loans; otherwise they would have to bear much higher risk resulting from concentrated investments. Thus small banks can only make small loans. Large banks have more capability to make large loans while achieving better risk diversification. Since the transaction cost for making a loan is, at least to some degree, independent of loan size, large banks understandably prefer making loans to large firms rather than small ones for transaction cost consideration.

The specialization based on size is also because small banks and large banks have different comparative advantage in serving different types of enterprises. The difference is rooted in the agency problem within the bank and its influence on the efficiency of banks in producing and using information. Such agency problems can exist between owners and management, between bank officers at higher levels and the local staff of the bank. Due to organizational

¹ Please see evidence in Nakamura(1994), Berger and Udell (1995, 1998), Jayaratne and Wolken(1999), etc.

complexity, such agency problems can be more severe in large banks. There are two types of information that banks can collect and rely on to make loan decisions. One type is more standard and hard information, such as firms' financial statements, which is easily communicated and verified among people. The other type is less standard and soft information, such as the ability and characters of firm managers, local market conditions, etc. In order to collect soft information, the lender often needs to keep closer contact or form a long-term relationship with the borrower. Furthermore, communication of such soft information between information collectors and others is often a tough task (Petersen, 2004). In large banks which are more organizationally complex, the authority to make lending decisions is often granted to bank officers at higher levels. Due to difficulty in the communication and verification of nonstandard information, these loan officers rely mainly on standard information. Expecting little reward to such efforts, local branch officers are discouraged from collecting soft information. Instead local bank officers in large banks have more incentive to collect hard information which is easily communicated to their supervisors. On the contrary, in small banks, where information collectors are often lending decision makers or close to lending officers, soft information can be more effectively transmitted and utilized. Thus small banks can provide more incentives for their local officers to collect soft information about borrowers¹ (Stein, 2002). The distinction between large and small banks in producing information can affect their choice of borrowers in a systematic way. Small businesses usually lack complete and audited financial statements, have a short credit history, and own less physical assets that can be pledged as collateral. The ability and characters of the owner or chief managers can exert more significant influence on the operation of small businesses. Therefore, banks lending to small businesses have to rely on soft information and small banks have advantages in this regard. In addition, it should be much easier for local small banks to observe and forge long-term relationships with small firms in the region². On the contrary, large banks prefer to do business with large firms which are able to provide more

¹ Consistent with these discussions, empirical studies find that big banks make lending decisions in a way systemically different from small banks. Big banks rely on standard information such as firms' formal financial statements to make loan decisions. Small banks depend more on qualitative information about borrowers acquired by the bank staff in their personal interactions with borrowers or by keeping exclusive relationships with borrowers (Cole et al, 2004; Berger et al, 2005).

² Please refer to Petersen and Rajan(1994) for the importance of lender-borrower relationship in small business lending.

standard financial information and collateral and have a longer credit history that banks can investigate.¹

III.2 Characteristics of firms

As we see in the above subsection, each financial institutional arrangement has its advantages and disadvantages. Thus the composition of various financial institutional arrangements in the financial system will affect its efficiency in mobilizing savings, allocating capital, and redistributing risks. However, it is hardly convincing to argue that one regime of financial structure is superior to another without taking into serious consideration the characteristics of firms, which constitute the main demand for capital. This subsection analyzes the characteristics of firms in size and risk which, we believe, are two critical factors determining how firms finance their investments.

III.2.1 The size of firms

The size of firms matters for their financing choice because there are economies of scale in financial transactions. Some components of transaction costs that firms incur in raising capital, such as expenses spent on financial auditing, information disclosure, security marketing and selling, contract negotiation and implementation, etc. are fixed. Small firms usually raise a smaller amount of capital than large firms and thus are at a disadvantage in terms of average transaction cost per unit of capital raised (Lin and Li, 2001). Moreover, empirical evidence shows that economies of scale with different sources of financing are different. Public equity financing has substantial economies of scale, followed by public bond issuing². Large companies enjoy some economies of scale when borrowing from banks but much less than in the case of public equity or

¹ The entry of foreign bank, the increase in competition among large banks and the improvements in risk assessment technology can increase the large banks' services to medium-size and even small-size enterprises in developing countries (World Bank 2007, de la Torre 2008). However, the basic picture is not changed. The extension of large banks' lending to SMEs still remains quite limited although other types of services increased substantially. The majority of smaller enterprises at the bottom of the pyramid of firms by size still have no access to bank loans.

² Many empirical studies show that the costs of raising capital through IPO or SEO are very high and the ratio of direct and indirect costs to proceeds in IPO and SEO is much higher for smaller issues (Chen and Ritter, 2000; Lee, Lockhead, Ritter, and Zhao, 1996; Kaserer and Kraft, 2003).

bond financing.

The distinction in transaction costs with respect to different financial arrangements may be related to legal requirements or regulations, but more fundamentally it can be attributed to the different extents to which financial transactions are subjected to informational asymmetry under different financial arrangements. As we analyzed earlier, informational asymmetry is more severe in public equity or bond issuing than in intermediated borrowing. Big companies usually have standard financial documents and a longer financial history and thus are able to raise capital on financial markets. But small firms often lack such standard information, which makes them more opaque than big companies and so small firms suffer from more severe informational asymmetry on financial markets. Thus small firms are less likely to raise capital through public financial markets, and they have to pay higher costs if they are able to do so. Except for those with very high risk and expected investment returns as in the high-tech industries, small firms typically rely upon banks for external finance (Berger and Udell, 1998). Furthermore, as we discussed in the last subsection, small business lending relies more on soft information about firms and thus small firms have to depend on small local banks to finance their investments.

III.2.2 The risk of firms

To the extent that investors are risk averse, the risk characteristics of firms are key factors determining their financing choices. Given the macro-economic environment, the idiosyncratic risk of a firm can be decomposed into three components based on risk sources: technological innovation risk, product innovation risk, and entrepreneurship risk.¹

¹ The entrepreneurship risk refers to the entrepreneur's ability in managing and operating the firm, which are not directly observable to outside fund providers. The distinction between technological innovation risk and product innovation risk is crucial in studying the financial system in advance economies. For early-stage firms in high-tech industries, venture capital acts as the main financier for the firms' R&D activities. Venture capital firms typically comprise small teams with technology backgrounds such as scientists and researchers and those with rich industry experience. With expert knowledge and industry experience, venture capitalists are able to identify novel ideas with high commercial potential and make sound judgments about the probability of success of the firm's R&D. By this way, venture capitalists can reduce the technological innovation risk facing them. After the success of firms' technological R&D, they need larger amount of capital to finance the production and marketing of their new products and to support the firms' expansion. For firms at this stage of growth, IPOs on NASDAQ are often the main financing channel so as to diversify the firms' product innovation risk. Such distinction between technological innovation risk and product innovation risk is not so important for developing economies whose industry and technology are far from the world frontier. For firms in these economies, technological innovation risk and product innovation risk are less distinctive. As we will elaborate below, if firms in developing economies

The first component of firm risk is attributed to the firm's technological innovation activities and thus depends mainly on the technological characteristics of the industry in which the firm operates. If the firm operates in some new industry it generally has to invest more intensively in R&D activities. Due to the inherent uncertainty of R&D, the firm is subject to more risk. If the firm operates in a mature industry and applies mature technologies, its technological innovation risk will be lower. Product innovation risk concerns the possibility that consumers may not accept the firm's new product. This type of risk facing the firm depends not only on the firm's marketing strategies and the related market competition but also on its novelty. It takes consumers more time to search and digest relevant information about brand new products. Thus for a firm operating in some new industry, even its R&D succeeds, its new products may not be easily accepted by the market and thus has higher product innovation risk. However, if a firm operates in a mature industry, its product faces less uncertainty on the market as long as its product is competitive relative to similar products. Entrepreneurship risk of a firm comes from uncertainty about the firm managers' ability in operating and managing the firm.

These three ingredients contribute to all firms' risk, but their weights in the firm's overall risk vary greatly for firms in different industries and different stages of development. This has important implication for the efficiency of alternative financial institutions in reducing informational asymmetry and risk sharing. For some firms with mature technology and products, uncertainties around managers' ability is the major source of firms' risk, then investors can collect historical information about the firms and their managers to make judgments about the firms' future prospects. Both banks and financial markets have developed some mechanisms to collect historical information and to screen and oversee firm managers. Which financial institutional arrangements perform better in dealing with these firms depending on firm size and transaction costs. For firms operate in new industries, in addition to entrepreneurship risk, technological innovation and product innovation ingredients play a prominent role in these firms' risk. Since available information related to firms'

follow the economies' comparative advantages, these two components of risk are very low

prospects is sparse, investors are hardly able to obtain enough information to form robust judgments, then risk sharing and diversification through financial markets will be more important for investors to finance these firms¹.

III.3. Factor endowments, optimal industrial structures and optimal financial structures

III.3.1 Factor endowments, optimal industrial structure, and characteristics of firms

In an open and competitive market, the relative abundance of endowments of various production factors, namely labor, capital, and natural resources, determines their relative prices, which in turn determine the costs of alternative production activities. If an economy is endowed with more abundant labor and relatively scarce capital, industries using labor-intensive technologies enjoy comparative cost advantages. Similarly, if capital is relatively abundant and labor is relatively scarce in the economy, industries with capital-intensive technologies will have comparative cost advantages. The optimal industrial structure in a market economy, therefore, reflects and is determined by its endowment structure of production factors. When its endowment structure changes² and so as well the relative prices of production factors, the optimal industrial structure will change correspondingly (Hechscher and Ohlin, 1991; Ohlin, 1967; Lin, 2003; Lin, 2009; Lin and Zhang, 2009)³.

¹ NASDAQ was established in the United States in the 1970s and has expanded together with venture capital in the past decades. This is an endogenous institutional change in the U.S. financial system to meet the challenge in financing small high-tech firms in the U.S. economy rather than an accidental phenomenon or an intentional design by the government.

² Since capital is usually accumulated at a faster rate than the growth of labor force and natural resources, the endowment structure of an economy tends to be more capital abundant as the economy develops. This process is referred to as “upgrading of endowment structure” in Lin (2003) and Lin (2009).

³ The development of Japan after the WWII is an example. In the 1950s, facing the fact that industrial facilities were destroyed in the war and unemployment rate was very high, Japan chose textile and other labor-intensive sectors as the starting point of industrialization. In the 1960s when labor shortage gradually appeared and labor cost was rising, labor-intensive sectors lost their comparative advantages in Japan, so capital-intensive heavy and chemical industries became the leading sectors in Japan’s economy. But lack of natural resources forced Japan economy to be dependent upon import of oil and other materials necessary for these industries. In the 1970s when oil price increased dramatically, heavy and chemical industries lost comparative advantages and Japan turned to capital-intensive and assembly-based auto industry to lead the economic growth. In the 1980s, Japan became one of the richest nations in the world in terms of income per capita. Then R&D- intensive electronic industries grew into the leading sectors in Japan economy. For detailed discussion about the path of Japan’s industrial upgrading, please see Ozawa(2005). Ju, Lin and Wang (2009) provide a formal model to the hypothesis that the change of optimal industrial structure in an economy is endogenous to the change of endowment structure in an economy.

At the micro-economic level, the profitability of a firm is affected by the ability of firm managers in operating and managing the firm, but more primarily, a firm must be viable in the first place¹. The viability of a firm is determined by the consistency of the firm's technology and industry choices with the comparative advantages of the economy. In an open market economy without policy distortions, firms operating in industries consistent with comparative advantages of the economy will be more competitive and more profitable. As we discussed in the last subsection, firms operating in different industries show different characteristics in terms of firm size and risk. Therefore, the endowment structure of a country at each stage of economic development constitutes the fundamental determinant of firms' characteristics that are relevant for the choice of financing at that stage.

The key characteristic endowment structure of developing countries is the relative abundance of unskilled labor and scarcity of capital. In these countries labor-intensive industries and the labor-intensive sections of capital-intensive industries have comparative advantages and dominate the economy². In the context of global economy, most industries consistent with comparative advantages of developing countries also exist or have ever existed in some advanced countries. Thus the industries, products, and technologies which are appropriate in developing economies are relatively mature. Firms in these countries can improve technologies and achieve industrial upgrading by introducing and imitating technologies from advanced economies³. So they face little technological innovation risk and product innovation risk, and entrepreneurship risk composes the major risk ingredient⁴. With respect to firm size, firms in labor-intensive industries are usually smaller, especially in terms of capital, compared to firms in capital-intensive industries.⁵. Therefore, the efficiency of the financial system in

¹ The concept of "viability" of firms is first proposed and defined by Lin (2003). A firm is viable if the firm with normal management is able to make socially acceptable normal profits in an open and competitive market without external subsidy from the government or others. Otherwise the firm is nonviable. It can be inferred that if a viable firm is not able to make socially acceptable normal profits it must be because of bad management.

² The analysis here also applies to developing economies with abundant natural resources. Due to lack of capital, these economies usually adopt labor-intensive technologies in most industries. Even in the sector of extraction of mineral resources, relatively labor-intensive technologies are often adopted except for those multinational corporations from rich countries.

³ Introduction and imitation of technologies from advanced countries have been one of the crucial factors that contributed to the rapid economic growth of Japan and Asian Tigers (Ozawa, 2005, 2006).

⁴ Japan's economic development after WWII followed the "excellent industrial flight map" provided by the U.S., U.K., and other advanced economies. And the U.S. market provided stable, mature, and large demand for Japanese products which contributed a lot to Japan's rapid economic growth in this period (Ozawa, 2005).

⁵ Kumar, Rajan, and Zingales (2002), Tybout (2000), and other empirical studies provide more robust evidence on

developing countries depends on its ability to serve the financing needs of labor-intensive small, mature businesses.

In advanced countries where capital is relatively abundant and labor cost relatively high, their economies have comparative advantages in capital-intensive industries and R&D-intensive high-tech industries and those industries are dominant in their economies. Although some industries existing in these economies are mature industries, advanced countries are on the global technology frontier in all sectors. Thus firms in these countries have to rely on R&D activities to improve technologies and promote industrial advancement. Consequently these firms have to assume high technological innovation risk and product innovation risk in addition to entrepreneurship risk. In terms of firm size, firms in capital-intensive industries are usually large, especially in terms of capital needs, due to economies of scale¹. Therefore, the efficiency of financial system in advanced economies depends on its financial arrangements' ability to serve the large capital needs and diversify risk.

III.3.2 The optimal financial structure

The basic functions of the financial system are to mobilize and allocate financial resources. An efficient financial system should be able to perform the above functions well and minimize systemic risks as well. Given the available financial resources at any given time, if a financial system can allocate the available financial resources to the efficient firms in the competitive sectors of an economy, the economy will be able to produce the largest possible economic surplus and the return to capital will be highest. As such the financial resources can be mobilized in the next period of time will be the largest and the systemic risk will also be the smallest. Therefore, the efficiency of a financial system depends on its ability to allocate financial resources to efficient firms in the competitive sectors in an economy.

this observation. According to Ozawa(2005), firms were small in Japan when labor-intensive industries dominated in the 1950s.

¹ Schere(1971) reviewed the literature on the significance of large companies in the U.S. economy before and after WWII. The basic trend is that large companies had become more significant in the whole economy. One reason behind this trend was the rising significance of capital-intensive industries. For example, in 1958, the 10 largest manufacturing companies concentrated in steel, chemical, and automobile industries.

As discussed earlier, looking at the characteristics of financial arrangements, we find both banks and stock markets have their own strengths and drawbacks in facilitating the allocation of financial resources from the fund providers to the firms. It is hard to say whether or not a bank-based financial system is more efficient than a market-based financial system. However, looking from the real economy side, we find that the endowment structure in an economy determines its optimal industrial structure and the characteristics of viable firms in the industrial structure. As borrowers or security issuers, firms with different size and risk characteristics tend to prefer or be limited to certain choices for financing. Therefore, for a country at some stage of its economic development, it can be hypothesized that some financial structure, compared to other financial structures, will be more efficient in performing its allocation function. In other words, there is a certain optimal financial structure in a certain stage of development, in which the composition and relative importance of available financial institutional arrangements can most efficiently allocate financial resources to viable firms in the competitive sectors of the optimal industrial structure determined by its endowment structure. If the above hypothesis is correct then the optimal financial structure for an advanced economy is likely to be different from that for a developing economy¹.

In advanced countries, where capital is relatively abundant and labor costs relatively high, the viable firms applying capital-intensive technologies and in high-tech industries dominate the economy. Firms in capital-intensive industries tend to be of large size and often require a larger amount of external finance. These firms also bear higher technological innovation risk and product innovation risk. With more standard financial information available, stock markets, bond markets, and big banks are the main finance providers to these capital-intensive firms. Firms in high-tech industries are often very risky but usually generate higher expected returns to investments. Venture capital is often involved in the early stage of these innovative firms, but stock markets play a critical role by providing exit options for venture capital and

¹ In the real world, the financial structure in a country is also affected by some legal, political, regulation, and other factors. Thus the financial structure in different countries at the same stage of economic development may not be exactly the same. However, these factors may only have secondary impacts on an economy's financial structure, compared to the impacts of endowment structure and its resulted industrial structure. The discussion of optimal financial structure in advanced and developing countries here should be read as a simplified description of the basic trend of optimal financial structure.

financing further development of these high-tech businesses. Therefore, a financial system dominated by stock markets and big banks is arguably more appropriate than a financial system dominated by small banks. Of course, there are also numerous labor-intensive small businesses in non-tradable sectors which are less significant in terms of value-added in GDP in the advanced economies¹. Thus a number of small banks are also needed for serving the financing demand of small businesses. However, the amount of funds transacted through these small financial institutions would consist of a small share in the whole financial system.

On the contrary, in developing countries with an abundant labor force and relatively scarce capital, labor-intensive industries have comparative advantages and are dominant in the economy. Businesses in these sectors tend to be smaller and typically require a smaller amount of external finance. Usually adopting mature production technologies, these firms involve less technological innovation risk and product innovation risk. They are more opaque due to lack of standard financial information. Thus screening firms and monitoring firm managers are the main concern for external fund providers of these firms. In this economic environment, banks, especially small local banks, have more strengths than stock markets. If there are no policy and other distortions, the financial system in these economies is likely to be characterized by the dominance of banks with small regional banks playing a significant role in the banking sector. Of course, there are some large firms even in labor-intensive industries and also those operating in such industries as communication, transportation, and other capital-intensive infrastructure industries. Thus a few large banks and financial markets serving these large businesses are likely to exist in the financial system.

According to the above hypothesis, the optimal financial structure for any country will be dynamic. As the country's economy develops and capital accumulates and thus its endowment structure upgrades, its leading industries will tend to be more capital-intensive and the appropriate technology for the economy will approach the world technology frontier. As a result, the viable firms will be of larger size and assume more technological innovation risk

¹ For instance, firms providing retailing, restaurant, repairing, and other services are usually small even in advanced countries.

and product innovation risk. The hypothesis predicts that the country's optimal financial structure will gradually evolve from a small bank-dominated regime to a system where big banks and financial markets play the leading role¹.

IV. Development Strategy, Policies, and Departure from Optimal Financial Structure

While the hypothesis in the paper argues that the endowment structure of the production factors and its resulted industrial structure are the most fundamental force shaping financial structure in an economy, there are many other factors affecting the evolution of the financial system and financial structure². Among them, the development strategy and resulting policies are consequential factors. It is not unusual that an inappropriate development strategy and related policies result in distortions of the financial structure and thus cause inefficiency of the financial system. There are many possibilities that the financial structure can be adversely affected by policies. Here we focus on some types of policy distortions to which poor countries are more likely to be prone.

As one of the most crucial institutions in modern society, the government plays a very special role in the country's economic development and the evolution of the financial system. If the government adopts a comparative-advantage-following (CAF) development strategy³, the markets will perform the basic function of resource allocation in the economy. Then market prices will

¹ Our hypothesis provides a new explanation for differences in financial structure between the Japan-Germany model and the U.S.-U.K. model. It is well documented that the bank was more prominent in Japan and Germany whereas the financial market was more prominent in U.S and U.K. From Industrial Revolution to the beginning of the 20th century, U.K. had been the most advanced country in the world. The United States has replaced the U.K. to be the most advanced country in the world since WWI. The leading industries and technologies in the U.K. and then in the United States have been at the world technology frontier. Therefore, financial markets which can mobilize huge amount of capital and diversify technological innovation risk and product innovation risk have been very active in the two countries' financial system. Germany and Japan were on a catching up progress until 1980s, measured by their per capita income (Maddison, 2006). The leading industries and technologies in Japan and Germany were thus inside the world technology frontier before the 1980s. So firms in these two countries assumed less risk than their counterparts in the United States and the United Kingdom. Therefore, banks played a more important role in Japan and Germany than in the U.S. and the U.K. Naturally, as the Japanese and German economies develop, their leading industries and technologies are increasingly closer to the world technology frontier. Correspondingly, financial markets are more and more important in Japan and Germany as well, thus their financial structure is becoming more similar to that of the U.S. and U.K..

² In this regard, the "law and finance" view is very well-accepted. Legal system does affect the functioning of financial system. Also, as Rajan and Zinales(2003) point out, political struggles sometimes may affect the evolution of financial system.

³ Please refer to Lin(2003) and Lin(2009) for detailed discussion of development strategy.

reflect the relative scarcities of production factors and social preferences. Facing right relative prices, economic agents will choose the industries, products, and technologies that are suitable for the economic conditions. Then it can be hypothesized that the demand of economic agents for financial services will induce the emergence and development of appropriate financial institutional arrangements. Consequently, the optimal financial structure that matches the optimal industrial structure will form. Of course, the government is not totally passive in this process because efficient operation of financial institutions requires a well-functioning legal system, wise regulations, and suitable supervision, which are all responsibilities of the government.

Thanks to the influential work by Shaw (1973) and McKinnon (1973) and others, it is well-known that “financial repression” has existed in many developing countries. The scenario in a “financially repressed” economy usually includes policies that restrict entry into the banking sector, control over interest rates, or even direct intervention in the allocation of bank loans. With these policies, the formal financial system is typically characterized by a primitive banking sector dominated by several inefficient big banks. Not only is the total scope of the financial sector artificially repressed, but also the financial structure is distorted. As a result, capital, the scarcest resource in these economies, is allocated in an extraordinarily inefficient way. Small businesses, which have comparative advantages in these economies, get little access to credit and have to rely heavily on internal capital or resort to informal channels for external finance. While Shaw (1973) and McKinnon (1973) insightfully capture the phenomenon of financial repression and convincingly analyze the detrimental effects of these repressive policies on economic development, a further question is why these distortionary policies were adopted in the first place. We propose that the development strategy adopted by the government is likely to be the main driving force leading to these repressive policies and distorted financial system.

If the government’s priority is to promote industries that are inconsistent with the comparative advantages endogenously determined by the economy’s endowments, as many developing countries practiced in the 1950s to 1970s under the influence of import-substitution strategy (Krueger 1992; Lal 1983), it has to use distortionary policies so as to channel scarce resources into the priority sectors (Lin and Li 2009). As a result, government interventions and consequent

repression of the financial system are inevitable. Due to the inertia of institutional change, such distorted policies can have a prolonged influence on the evolution of the financial system. China's experience provides a perfect example for this argument. In the 1950s, the factor endowments in the Chinese economy were characterized by extreme scarcity of capital and enormous abundance of labor. The government, however, decided to adopt an ambitious comparative-advantage-defying (CAD) development strategy in which establishment and development of heavy industries took the first priority. In order to push the development of heavy industries, which are very capital-intensive, the government had to deliberately distort the prices of various products and production factors including labor, capital, foreign exchange, etc.; replace the market mechanism with a government planning system so as to control the allocation of production factors; nationalize private businesses; and collectivize agricultural production with the People's Communes (Lin, Cai, and Li, 2003). In this centrally planned economic regime, banks were terminated or merged into the People's Bank of China, which became the only financial institution in the whole economy until the end of 1970s. Although the government's development strategy for the real economy has gradually shifted from a CAD path to the CAF track since the 1980s, reform in the financial system has lagged behind. As part of the economic reform, four big state-owned banks were established in the early 1980s. A dozen of joint-stock commercial banks were also set up in the late 1980s and early 1990s. But interest rates are still under the control of the state and domestic entry into the banking sector is rigidly restricted by the government. The market share of the four big state-owned banks has slowly declined, but they still hold a dominant position in the banking system today. Because of this serious mismatch of financial structure with the optimal industrial structure, labor-intensive small businesses have very limited access to formal financial credit, which reduces job creation and widens inequality of income distribution in China (Lin and Liu 2008).

While the notion that financial repression is harmful to the economy is well accepted both in theory and in practice, another type of policy distortion is less likely to be acknowledged. As a policy prescription to correct financial repression, financial liberalization has been generously prescribed by theorists and exercised by many developing countries. Those repressive policies should be reformed. However, if the hypothesis proposed in the paper is correct, then according to

the hypothesis, some new, less noticeable policy distortions may be introduced in the process of financial liberalization. It has been very common that developing countries are advised to establish and develop financial systems similar to the model in the advanced economies. The U.S. financial system where financial markets are highly active is often taken as the best model that developing countries should follow. This model is often justified by the supposed superiority of financial markets. But as the hypothesis in the paper indicates, the optimal financial structure for poor countries is likely to be systemically different from that for advanced economies. If the hypothesis is correct, imitating the financial model of advanced economies will not lead to improved efficiency of the financial system or generate better economic performance in poor countries. Such imitation may even result in destructive consequences such as financial crises.

V. Conclusion

This paper proposes and elaborates a theoretical hypothesis that the optimal financial structure in an economy depends on its stage of economic development. Existing studies have insightfully analyzed the strengths and weaknesses of various financial institutional arrangements in providing financial services, but these studies do not pay enough attention to the characteristics of the real sector in the economy and so are unable to assess the relative efficiencies of alternative types of financial structure at a country's different stages of development. This paper argues that the structure of factor endowments in a country is the most fundamental force determining its optimal financial structure. The main arguments are as follows: The factor endowment structure, which is given at a given time and changeable over time, determines the optimal industrial structure and its evolution in the economy. Firms operating in different industries and applying different technologies have different characteristics in terms of firm size and risks. Thus the demand for financial services by the real sector in the economy can be systemically affected by the endowment structure and its corresponding optimal industrial structure. A financial structure is optimal for a country at some stage of economic development only when the characteristics of the financial structure match the characteristics of the optimal industrial structure determined by the endowment structure in the economy. Since countries at different stages of economic development have

different endowment structure and thus optimal industrial structure, no financial structure is universally optimal for all countries. But there is a specific financial structure that is optimal for a country at a specific stage of economic development. Thus optimal financial structure is endogenously determined and also dynamic. As the country's economy develops and its endowment structure updates, its industrial structure and the characteristics of firms in the country change, and also the optimal financial structure for the country evolves correspondingly.

The general trend of financial structure in the developed and developing countries mentioned at the beginning of this paper is consistent with the hypothesis proposed in this paper. According to the hypothesis, the financial structure in an economy is endogenous and formed through rational choices of economic agents in responding to characteristics of firms in the optimal industrial structure determined by factor endowments in the economy. Many political, legal, and cultural factors in the society may affect financial development and financial structure in some specific ways and at some times, but they may not be the most fundamental determinants of financial structure in an economy.

So far the debates about the relationship between financial structure and economic growth in the literature neglect the features of the real sector's demand for financial services. The inconsistency between empirical research results and the factual trend of evolution of financial structure can probably be attributed to the implicit perspective in the paper. According to the hypothesis of optimal financial structure, to evaluate the financial structure in one country, the right question to ask is not whether it is similar to the financial structure of advanced economies, but whether it is suitable for the industrial structure determined by the endowments in this country. There is no one-size-for-all optimal financial structure. Thus it is not surprising that discussions of the bank-based vs. market-based financial structure without taking into account the characteristics of real economy have not reached an agreement.

We fully realize that the discussion of optimal financial structure in this paper is still very primitive. There are some ambiguities and omissions that need to be clarified or completed. In

particular, we focus on the substitute side of alternative financial institutional arrangements and emphasize their respective advantages and weaknesses, but we do not analyze the potential complementary of alternative financial arrangements. In addition, more detailed empirical and theoretical research is necessary to finally establish the theory of optimal financial structure proposed in this paper¹. With all these shortcomings in mind, we hope that this paper provides a new perspective for research on the relationship between financial structure and economic development.

Reference

- (1) Allen, F., “The Market for Information and the Origin of Financial Intermediaries”, *Journal of Financial Intermediation*, 1990, 1: 3-30.
- (2) Allen, F. and D. Gale, “Diversity of Opinion and Financing of New Technologies”, *Journal of Financial Intermediation*, 1999, 8: 68-89.
- (3) Allen, F. and D. Gale , *Comparing Financial Systems*, Cambridge, MA: MIT Press, 2000.
- (4) Beck, T. and R. Levine, “Industry Growth and Capital Allocation: Does Having a Market- or Bank-Based System Matter?” *Journal of Financial Economics*, 2002, 64: 147-180.
- (5) Beck, T., A. Demirgüç-Kunt and R. Levine, “Law and Finance: Why Does Legal Origin Matter?” *Journal of Comparative Economics*, 2003, 31:653-674.
- (6) Berger, Allen N., and Gregory F. Udell, “Relationship lending and lines of credit in small firm finance”, *Journal of Business*, 1995, 68, 351-382.
- (7) Berger, Allen N., and Gregory F. Udell, “The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle”, *Journal of Banking & Finance*, 1998, 22 : 613-673 .
- (8) Berger, Allen N., Anthony Saunders, Joseph M. Scalise, and Gregory F. Udell, “The effects of bank mergers and acquisitions on small business lending”, *Journal of Financial Economics*, 1998, 50, 187-229.
- (9) Berger, A.N., N.H. Miller, M.A. Petersen, R.G. Ragan, and J.C.Stein,, “Does Function Follow Organizational Form? Evidence from the Lending Practices of large and Small Banks”, *Journal of Financial Economics*, 2005, 76: 237-269.
- (10) Berle, A. A. and G. C. Means (1932), *The Modern Corporation and Private Property*, New York:Harcourt Brace Jovanovich.
- (11) Bhide, A., “The Hidden Costs of Stock Market Liquidity”, *Journal of Financial Economics*, 1993, 34: 1-51.
- (12) Boyd, J. H. and E. C. Prescott, "Financial Intermediary-Coalitions", *Journal of Economic Theory*, 1986, 38: 211-232.
- (13) Brickley, J.A., and J. S. Link, and C. W. Smith Jr., “Boundaries of the Firm: Evidence from the Banking Industry”, *Journal of Financial Economics*, 2003, 70: 351-383.

¹Lin and Sun (2008) use the provincial panel data on banking structure in China to test the theory of financial structure. The empirical results show that the economy grows faster in regions where small banks play a more active role in the banking sector. This is consistent with the theory of optimal financial structure.

- (14) Cetorelli, N. and P. E. Strahan (2006), "Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets", *Journal of Finance*, LXI, 1: 437-461.
- (15) Chen, H.C. and J.R. Ritter, 'The Seven Percent Solution', *Journal of Finance*, 2000, 55, pp. 1105-31.
- (16) Cole, R.A., L.G. Goldberg, And L.J.White, "Cookie Cutter vs. Character: The Micro Structure of Small Business Lending by Large and Small Banks", *Journal of Financial and Quantitative Analysis*, 2004, 39: 227-251.
- (17) De la Torre, A., M.S.M. Peria, S. L. Schukler, "Bank Involvement with SMEs: Beyond Relation Lending" World Bank Policy Working Paper, WPS 4649, 2008.
- (18) Demirguc-Kunt, A. and R. Levine, *Financial Structure and Economic Growth: A Cross-Country Comparison of Banks, Markets, and Development*, Cambridge, MA: MIT Press, 2001.
- (19) Demirgüç-Kunt, A. and V. Maksimovic, "Funding Growth in Bank-Based and Market- Based Financial Systems: Evidence from Firm Level Data", *Journal of Financial Economics*, 2002, 65: 337-363
- (20) Diamond, D. W., "Financial Intermediation and Delegated Monitoring", *Review of Economic Studies*, 1984, 51: 393-414.
- (21) Goldsmith, R., *Financial Structure and Development*, New Haven: Yale University Press, 1969.
- (22) Grossman, S.J. and O. Hart, "Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation", *Bell Journal of Economics*, 1980, 11: 42-64.
- (23) Heckscher, E.F and Ohlin, B. (1991), *Heckscher-Ohlin Trade Theory*, translated, edited and introduced by Harry Flam and M. June Flanders, Cambridge, Mass.: MIT Press, 1991.
- (24) Jackson J. and A. Thomas, (1995) , "Bank Structure and New Business Creation: Lessons from an Earlier Time", *Regional Science and Urban Economics*, 25: 323-353.
- (25) Jayaratne, J. and P. E. Strahan, (1996), "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation", *Quarterly Journal of Economics*, 111: 639-670.
- (26) Jayaratne, J. and J. Wolken, "How Important Are Small Banks to Small Business Lending? New Evidence from a Survey of Small Firms", *Journal of Banking and Finance*, 1999, 23: 427-458.
- (27) Jensen, M., "Takeovers: Their Causes and Consequences", *Journal of Economic Perspectives*, 1988, 2: 21-48.
- (28) Ju, Ji. J. Lin, and Y. Wang. "Endowment Structure, Industrial Dynamics, and Economic Growth," World Bank Policy Research Working Paper, forthcoming, 2009.
- (29) Kaserer, C. and M. Kraft, "How Issue Size, Risk, and Complexity are Influencing External Financing Costs: German IPOs Analyzed from an Economies of Scale Perspective", *Journal of Business Finance & Accounting*, 2003, 30:479-512.
- (30) Krueger, A. *Economic Policy Reforms in Developing Countries*. Oxford: Basil Blackwell, 1992.
- (31) Kumar, Krishna B., Raghuram G. Rajan, Luigi Zingales, "What Determines Firm Size," working paper, 2002.
- (32) La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny, "Legal Determinants of External Finance", *Journal of Finance*, 1997, 52: 1131-1150.
- (33) La Porta, R. , F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny, "Law and Finance", *Journal of Political Economy*, 1998, 106: 1113-1155.
- (34) Lal, D. *The Poverty of Development Economics*, Cambridge, MA: Harvard University Press, 1983.
- (35) Lee, I., S. Lochhead, J. Ritter and Q. Zhao, 'The Costs of Raising Capital', *Journal of Financial Research*, 1996, 19: 59-74.
- (36) Levine, R., "Finance and Growth: Theory and Evidence." in Philippe Aghion and Steven Durlauf, eds. *Handbook of Economic Growth*, The Netherlands: Elsevier Science. 2005.

- (37) Levine, R., "Bank-Based or Market-Based Financial Systems: Which Is Better?" *Journal of Financial Intermediation*, 2003, 11: 398-428.
- (38) Lin, Justin Yifu, "An Economic Theory of Institutional Change: Induced and Imposed Change", *Cato Journal*, 1989, 9: 1-33.
- (39) Lin, Justin Yifu. "Development Strategy, Viability, and Convergence." *Economic Development and Cultural Change*, 2003, 41, no. 2: 277-308.
- (40) Lin, Justin Yifu. *Economic Development and Transition: Thought, Strategy, and Viability*. Cambridge: Cambridge University Press, 2009.
- (41) Lin, J. Y., and Y. Li, "SME Financing and Small Financial Institutions' Development", *Economic Research Journal*, 2001, No.1. (In Chinese)
- (42) Lin, J.Y. and F. Li, "Development Strategy, Viability and Distortions in Developing Countries," *World Bank Policy Research Paper*, No. 4096, 2009.
- (43) Lin, J.Y. and P. Liu, 2008. "Achieving Equity and Efficiency Simultaneously in the Primary Distribution Stage in the People's Republic of China," *Asian Development Review*, vol. 25, nos. 1-2: 34-574..
- (44) Lin, J. Y. and X. Sun, "Banking Structure and Economic Growth", *Economic research journal*, 2008, No. 9. (in Chinese)
- (45) Lin, J. Y., X. Sun, Y. Jiang, "On the Optimal Financial Theory in Economic Development", CCER working paper, 2006. (in Chinese).
- (46) Lin, Justin Yifu and Feiyue Li. "Development strategy, viability, and economic distortions in developing countries," *World Bank: Policy Research Working Paper* No. 4906, 2009.
- (47) Lin, Justin Yifu and Pengfei Zhang. "Industrial Structure, Appropriate Technology, and Economic Development in Less-developed countries," *World Bank: Policy Research Working Paper*, No. 4905, 2009.
- (48) Lin, J. Y., F. Cai, and Z. Li, *China's Miracle: Development Strategy and Economic Reform*, Hong Kong: Chinese University of Hong Kong press, 2003.
- (49) Maddison, Angus, *The World Economy*, Paris, France : Development Centre of OECD, 2006.
- (50) McKinnon, R. I., *Money and Capital in Economic Development*, Washington, D.C.: Brookings Institution, 1973.
- (51) Merton, R. C. (1995), "A Functional Perspective of Financial Intermediation", *Financial Management*, 1995, 24: 23-41.
- (52) Merton, R. C. and Z. Bodie, "A Conceptual Framework for Analyzing the Financial Environment", In: *The Global Financial System: A Functional Perspective*, Eds: D. B. Crane, et al., Boston, MA: Harvard Business School Press: 3-31, 1995.
- (53) Nakamura, L., "Small Borrowers and the Survival of the Small Bank: Is Mouse Bank Mighty or Mickey?" *Federal Reserve Bank of Philadelphia, Business Review*, 1994, Nov-Dec, 3-15.
- (54) Ohlin, B. (1967), *Interregional and International Trade*, Revised edition. Cambridge, Mass.: Harvard University Press.
- (55) Ozawa, Terutomo, *Institutions, Industrial Upgrading, and Economic Performance in Japan: The 'Flying-Geese' Paradigm of Catch-up Growth*, Cheltenham: Elgar, 2005.
- (56) Ozawa, Terutomo, (2006), "Asia's Labor-driven Economic Development, Flying-Geese Style." *UNU-WIDER research paper*, NO. 2006/59.
- (57) Petersen, M. A. and R. G. Rajan, "The Benefits of Lending Relationships: Evidence from Small Business Data", *Journal of Finance*, 1994, 49: 3-37.
- (58) Petersen, M.A., and R.G. Rajan (1995), "The Effect of Credit Market Competition on Lending

- Relationship”, *Quarterly Journal of Economics*, CX, 407-43.
- (59) Petersen, M. A., "Information: Hard and Soft", working paper, 2004.
 - (60) Rajan, R. G., "Insiders and Outsiders: The Choice Between Informed and Arms Length Debt", *Journal of Finance*, 1992, 47: 1367-1400.
 - (61) Rajan, R. G. and L. Zingales, "Which Capitalism? Lessons From the East Asian Crisis", *Journal of Applied Corporate Finance*, 1998, 11: 40-48.
 - (62) Rajan, R. G. and L. Zingales, "The great reversals: the politics of financial development in the twentieth century," *Journal of Financial Economics*, 2003, 69:5 – 50.
 - (63) Shaw, A.S., "*Financial Deepening in Economic Development*", New York:Oxford University Press, 1973.
 - (64) Schere, F.M., "*Industrial Market Structure and Economic Performance*", Chicago: Rand McNally and Company, 1971.
 - (65) Shleifer, A. and R. W. Vishny, "A Survey of Corporate Governance", *Journal of Finance*, 1997, 52: 737-783.
 - (66) Stiglitz, J. E., "Credit Markets and the Control of Capital", *Journal of Money, Credit and Banking*, 1985, 17: 133-152.
 - (67) Strahan, P.E., J.P., Weston, "Small business lending and the changing structure of the banking industry", *Journal of Banking and Finance*, 1998, 22, 821-845.
 - (68) Stein, J. C., "Information Production and Capital Allocation: Decentralized versus Hierarchical Firms", *Journal of Finance*, 2002, LVII: 1891-1921.
 - (69) Tybout, James R., "Manufacturing Firms in Developing Countries: How Well Do They Do, and Why?" *Journal of Economic Literature*, 2000, 38 :11-4.
 - (70) World Bank. Finance for All? Policy and Pitfall in Expanding Access. Washington, DC.
 - (71) Zingales, L., "The Value of the Voting Right: A Study of the Milan Stock Exchange Experience", *Review of Financial Studies*, 1994, 7: 125-148.